

## WHAT IS CLAIMED IS:

1. A chemical decontamination method of chemically decontaminating radioactive nuclides from a metallic material surface contaminated by the radioactive nuclides, the method comprising the steps of:
- reductively decontaminating using a reductive decontaminating agent containing at least two kinds of components; and then decomposing said reductive decontaminating agent using a decomposing apparatus for decomposing at least two kinds of chemical substances in said reductive decontaminating agent.
2. A chemical decontamination method according to claim 1, wherein in said step of decomposing said reductive decontaminating agent using the decomposing apparatus, said at least two kinds of chemical substances in said reductive decontaminating agent are decomposed at a time.
3. A chemical decontamination method according to claim 1, wherein when said apparatus for decomposing at least two kinds of chemical substances in said reductive decontaminating agent cleanses radioactive nuclides from the decontaminating agent using a cation resin column during decontaminating, a composition trapped by said cation resin column at an inlet side of a cleaning apparatus is selectively decomposed.

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reductively decontaminating using a reductive  
decontaminating agent; and then

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7. A chemical decontamination method according to any one of claim 1 to claim 6, wherein said reductive decontaminating agent contains oxalic acid and hydrazine, and is a reductive acid solution of which a concentration of oxalic acid is 0.05 to 0.3 wt% and a pH is 2 to 3.

8. A chemical decontamination method according to any one of claim 1 to claim 6, which further comprises an oxidative dissolving process for oxidatively dissolving chromium in a metal oxide on the metallic material surface contaminated by the radioactive nuclides into hexadic chromium using permanganate before or after the reductive dissolving process for dissolving and removing the metal oxide.

9. A chemical decontamination method according to claim 8, wherein said reductive dissolving process and said oxidative dissolving process are alternatively performed, and said reductive dissolving process is performed at least twice.

10. A chemical decontamination method according to any one of claim 1 to claim 9, wherein a catalyst decomposition column is used as the decomposing apparatus for the reductive decontaminating agent.

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11. A chemical decontamination method according to claim 10, wherein at least one element selected from the group consisting of platinum, ruthenium, vanadium, palladium, iridium and rhodium is used as a catalyst filled in said catalyst column, and an oxidizing agent is supplied in an inlet side of said catalyst column.

12. A chemical decontamination method according to any one of claim 1 to claim 11, wherein a quantity of hydrogen peroxide added is less than an equivalent weight of the components trapped in the cation resin column when components trapped in the cation resin column is selectively decomposed, and a quantity of hydrogen peroxide added is more than an equivalent weight react with the components trapped in the cation resin column when components trapped in the cation resin column and components trapped in the anion resin column are decomposed at a time.

13. A chemical decontaminating system, which comprises a catalyst decomposition column in an upstream side of an ion exchange resin column and a hydrogen peroxide injection apparatus in a further upstream side in order to reduce an amount of waste products caused by a chemical decontaminating agent in a case where a mixed decontaminating agent for a composition trapped in a cation resin column and for a composition trapped in an anion

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exchange resin is used for the chemical decontaminating agent, and in order to selectively decompose the composition trapped in a cation resin column in an inlet side of a cleaning apparatus when radioactive nuclides in  
5 the decontaminating agent are cleansed using the cation resin column during decontaminating and decompose the both compositions after completion of decontaminating process.

- 10 14. A chemical decontaminating system according to claim 13, which further comprises a gas-liquid separating apparatus for separating decomposed gas in an upstream side of the catalyst decomposition column and in a downstream side of the ion exchange resin.

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